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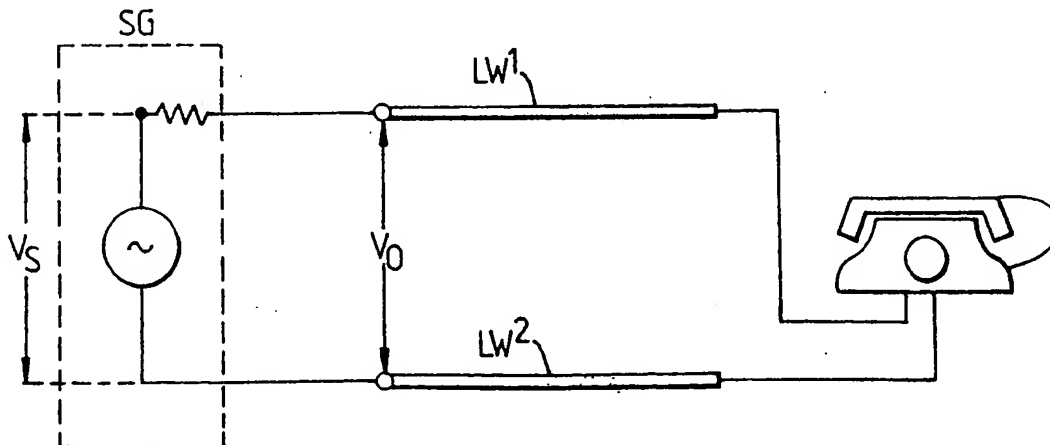
(56) Documents cited
GB 1420658
EP A1 0055977

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H4K
Selected US specifications from IPC sub-class H04M

(54) Method of testing telephone subscriber's lines

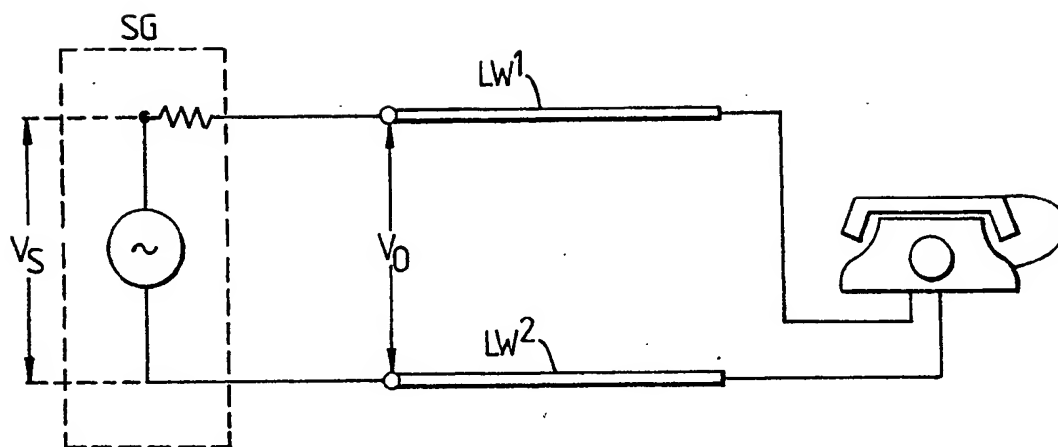
(57) To test the attenuation of a telephone subscriber's line two measurements are made with the telephone on hook, one at a relatively low frequency and the other at a relatively high frequency. The frequencies chosen in one case are 900 Hz and 3 KHz.

To do this a signal generator (SG) with a known internal impedance, e.g. 600 ohms, is connected to the line wires (LW1 and LW2), and the voltage ratio V_o/V_s determined. The two ratios thus obtained, plus a knowledge of the internal resistance of the generator, give a good assessment of the line's impedance characteristics.



The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.

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SPECIFICATION

Method of testing telephone subscriber's line

5 This invention relates to the measurement of the line attenuation of telephone lines, i.e. the lines which connect the exchange apparatus to the subscriber's apparatus.

The electrical characteristics of such lines vary over very wide ranges, which can be inconvenient in practice. While such attenuation has always been important, it is more important with the need to serve a wider range of subscriber's apparatus than in the past. Now in the British public telephone network, a subscriber's line may consist of combinations of different types of cables with varying and often random lengths. This should give an end-to-end line resistance of up to 1250 ohms and an end-to-end loss of up to 15dB.

20 To measure line attenuation it is desirable to do so with the subscriber's apparatus on hook, since this avoids disturbing the subscriber, unlike some contemporary measurement techniques which need the apparatus to be in the off-hook condition. The value of attenuation which has been most used in the past when determining line attenuation is the image attenuation at 1600 Hz, since in general this gives a better indication of speech loss than does line resistance. Unfortunately for practical reasons it has been found that when measurements are made at this frequency the results have been erratic, and often worse than when measuring line resistance.

35 An object of the present invention is to provide a method of determining line attenuation which gives better results than do the methods hitherto used.

According to the invention there is provided a method of measuring the attenuation characteristics of the line between a telephone exchange and the telephone subscriber's apparatus, in which the measurement is effected while the subscriber's apparatus is on hook, and in which the measurement is made at two different frequencies one of which is near to the low frequency end of the speech band for the line while the other frequency is near to the high frequency end of said band, the attenuation being determined on the basis of the two values thus obtained.

50 An embodiment of the invention will now be described with reference to the accompanying highly schematic drawing.

In the drawing, a signal generator SG with a nominal resistance of 600 ohms is connected to the line wires LW1 and LW2, the other ends of which are connected to the telephone subscriber's apparatus.

This is, for instance a British Telecom type 706 set, or any apparatus having a ring detector impedance exceeding that prescribed in British Standards Specification No. BS 6305 p.4.1.3.

The tests are performed by measuring the voltage V_s across the generator and the voltage V_o across the line terminals, and this is done at two frequencies, one near the lower end of the speech

band and the other near the higher end of the speech band. In the present arrangement this is done at 900 Hz and at 3 KHz, and the ratio V_o/V_s for each of these frequencies is determined. In this case we have the generator's impedance effectively in series with the line's impedance at the measurement frequency. Thus the combined effects of these measurements give a good approximation to the actual attenuation to which the speech will be subjected in use.

Each ratio indicates how the AC at the appropriate frequency is being attenuated by the line, and for each line measured the combined effects of the two ratio determinations gives a useful indication of line attenuation.

When studying a large group of lines to assess their characteristics, the ratios for each measurement are plotted on a graph the vertical of which are the ratios for 3 KHz and the horizontals are the ratios for 900 Hz. This gives a so-called scatter diagram which indicates the relative characteristics of those lines.

CLAIMS

90 1. A method of measuring the attenuation characteristics of the line between a telephone exchange and the telephone subscriber's apparatus, in which the measurement is effected while the subscriber's apparatus is on hook, and in which the measurement is made at two different frequencies one of which is near to the low frequency end of the speech band for the line while the other frequency is near to the high frequency end of said band, the attenuation being determined on the basis of the two values thus obtained.

2. A method as claimed in claim 1, in which the measurement is effected by connecting an alternating current generator having a known resistance to the line wires and measuring the voltage V_s across the generator and the voltage V_o across the line terminals, the value of the ratio V_o/V_s being indicative of line attenuation.

3. A method as claimed in claim 1 or 2, and in which the frequencies chosen are 900 Hz and 3 KHz.

4. A method of measuring the attenuation characteristics of the line between a telephone exchange and a telephone subscriber's apparatus, substantially as described with reference to the accompanying drawings.

5. Apparatus for measuring the attenuation characteristics of the line between a telephone exchange and a telephone subscriber's apparatus, which measurement is made while the telephone apparatus is on hook, which includes a signal generator having a known impedance which is connected to the line terminals at the exchange when a measurement is to be made, and means to measure the voltage V_s across the generator and the voltage V_o across the line terminals for a first frequency such as 900 Hz near the lower end of the speech band and for effecting the same measurement for a second frequency such as 3 KHz near the upper end of the speech band, the two values of V_o/V_s thus obtained being indicative of the line's attenuation over the speech band.

6. Apparatus for measuring the attenuation characteristics of the line between a telephone exchange and a telephone subscriber's apparatus,

substantially as described with reference to the accompanying drawing.

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